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RESEARCH PROBLEMS

In Volume 36 of Discrete Mathematics, a Research Problem Section has been established. Problems in this section are intended to be research level problems rather than standard exercises. People wishing to submit such problems should send them (in duplicate) to:

Professor Brian Alspach,
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Burnaby, B.C. V5A 1S6,
Canada.

The following should be included: (1) The name of the person(s) who originally posed the problem; (2) the name and address of a person willing to act as a correspondent; and (3) references and other pertinent information.

The Editorial Board of Discrete Mathematics invites readers to provide information about solutions, partial results and other pertinent items related to problems posed earlier, if possible indicating the source of the information, for example papers appearing in different journals, preprints, etc. This information will be passed along to readers from time to time in order to keep them appraised of the current status of various problems.

People wishing to provide information about problems that appeared earlier should write to Professor Alspach. People wishing to correspond on technical matters concerning a problem should write to the correspondent.

Problem 13. Posed by L. Babai.

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A graph Y is a *contraction* of a graph X if there is a function f mapping the vertex-set of X, denoted $V(X)$, onto the vertex-set of Y satisfying:

(a) the subgraph of X induced by $f^{-1}(u)$ for $u \in V(Y)$ is connected, and

(b) u_iu_j are adjacent in Y if and only if there exist $v_i \in f^{-1}(u_i)$ and $v_j \in f^{-1}(u_j)$ such that v_i is adjacent to v_j.

The *Hadwiger number* of a graph X, denoted $h(X)$, is the largest integer n for which the complete graph K_n is a contraction of X.

A *circulant graph* $X(n, S)$ has vertex-set $u_0, u_1, \ldots, u_{n-1}$ with u_i adjacent to u_j if and only if $j-i \equiv s \pmod n$ for some $s \in S$ where $S = -S$. If p is a prime satisfying $p \equiv 1 \pmod 3$, let $S(p) = \{\pm 1, \pm\varepsilon, \pm\varepsilon^2\}$ where $\varepsilon^3 \equiv 1 \pmod p$ and $\varepsilon \not\equiv 1 \pmod p$. If $X(p) = X(p, S(p))$, is it true that $\lim_{p\to\infty} h(X(p)) = \infty$?

Problem 14. Posed by P.D. Seymour.

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Is it true that in a non-binary 4-connected matroid, every triple of elements is the intersection of a circuit and a cocircuit?